METALLIC COATINGS
March 13, 1995

General Requirements

1.01 Description

A. This specification covers the requirements for thermal spray metallic coatings, with and without topcoats, as a means to prevent corrosion.

B. The coating system consists of surface preparation by wash cleaning and abrasive blast cleaning, application of metallic coating, and, where specified, shop coat and/or shop coat plus topcoat. The system also includes inspection and acceptance requirements.

1.02 Definitions

A. See "Thermal Spraying: Practice, Theory, and Application" prepared by AWS Committee on Thermal Spraying.

1.03 Reference Standards

A. The standards referenced in this specification form a part of this specification.

B. Steel Structures Painting Council (SSPC) Specifications

SSPC-SP 5	White Metal Blast Cleaning
SSPC-SP 10	Near-White Blast Cleaning

C. Other Standards

ASTM-C-633	Test Method for Adhesive or Cohesive Strengths of Flame-Sprayed Coatings
ASTM D4417	Standard Test Methods for Field Measurement of Surface Profile of Blast-Cleaned Steel
ASTM D2092	Primer Pretreatment

1.04 Quality Assurance

A. A representative sample of each lot of the coating material used shall be submitted to the Engineer for analysis prior to use.

B. The Thermal sprayed coating shall have a uniform appearance. The coating shall not contain any blisters, cracks, chips or loosely adhering particles, oil or other surface contaminants, nodules, or pits exposing the substrate.

C. The Engineer may cut through the coating with a knife or chisel. If upon doing so, any part of the coating lifts away from the base metal 6 millimeters or more ahead of the cutting blade without cutting the metal, then the bond is considered not effective and is rejected.

D. Coated areas which have been rejected or damaged in the inspection procedure described shall have the defective sections blast cleaned to

remove all of the thermal sprayed coating and shall then be recoated. Before resubmittal and inspection, those sections where coating has not reached the required thickness shall be sprayed with additional metal until that thickness is achieved.

1.05 Submittals

A. The Contractor shall submit to the Engineer, prior to abrasive blast cleaning, a 300 millimeter by 300 millimeter steel plate, of the same material and approximate thickness of the steel to be coated, blasted clean to meet the requirements of Paragraph 3.01 C below. The sample plate will be checked for specified angular surface pattern, the abrasive grit size and type used, and the proceedure used. This plate shall be used as the visual standard to determine the acceptability of the cleaned surface. In the event the Contractor's cleaning operation is inferior to the sample plate, the Contractor shall be required to correct the cleaning operation to do a job comparable to the specimen submitted.

Materials

2.01 Metallic Coatings

A. The material used for spraying shall be made especially for that purpose. Zinc shall have a minimum purity of 99.9 percent.

2.02 Shop Coats and Field Coats

A. Shop coats and field coats shall be as specified in the Contract Provisions.

Construction Requirements

3.01 Surface Preparation

A. Surface irregularities (e.g., sharp edges and/or carburized edges, cracks, delaminations, pits, etc.) interfering with the application of the coating shall be removed or repaired, prior to wash cleaning. Thermal cut edges shall be ground to reduce hardness to attain the surface profile required from abrasive blast cleaning.

B. All dirt, oil, scaling, etc. shall be removed prior to blast cleaning. All surfaces shall be wash cleaned with either clean water at 55 megapascals or water and detergent at 14 megapascals with two rinses with clean water.

C. The surface shall be abrasive blast cleaned to white metal (SSPC-SP 5). The surface profile will be measured using a surface profile comparator, replica tape, or other method suitable for the abrasive being used in accordance with ASTM D4417.

D. Where zinc coatings up to and including 0.23 mm thick are to be applied, one of the following abrasive grits shall be used with pressure blast equipment to produce a 75 micrometer AA anchor tooth pattern.

(1) Aluminum oxide or silicon carbide
mesh size: SAE G-25 to SAE G-40

(2) Hardened steel grit
mesh size: SAE G-25 to SAE G-40

(3) Garnet, flint, or crushed nickel slag
mesh size: SAE G-25 to SAE G-50

Where zinc coatings greater than 0.25 mm thick are to be applied, one of the following abrasive grits shall be used with pressure blast equipment to produce a 130 micrometer AA anchor tooth pattern.

(1) Aluminum oxide or silicon carbide
mesh size: SAE G-18 to SAE G-25

(2) Hardened steel grit
mesh size: SAE G-18 to SAE G-25

(3) Garnet, flint, or crushed nickel slag
mesh size: SAE G-18 to SAE G-25

E. The pressure of the blast nozzle, as measured with a needle probe gauge, with pressure type blasting equipment shall be as follows:

1. With aluminum oxide, silicon carbide, flint, or slag - 345 kilopascals minimum and 414 kilopascals maximum.

2. With garnet or steel grit - 517 kilopascals minimum.

The pressure at the blast nozzle, with syphon blasting (suction blasting), shall be as follows:

1. With aluminum oxide, silicon carbide, flint, or slag - 517 kilopascals maximum.

2. With garnet or steel grit - 621 kilopascals maximum.

F. The abrasive blast stream shall be directed onto the substrate surface at a spray angle of 75 to 90 degrees, and moved side to side. The nozzle to substrate distance shall be 100 to 300 millimeters.

3.02 Application of Metallic Coating

A. No surface shall be sprayed which shows any sign of condensed moisture or which does not comply with the requirements of Paragraph 3.01 C above. Thermal spraying must not take place when the relative humidity is 90% or greater, when the steel temperature is less than 3 degrees C above the dew point, or when the air or steel temperature is less than 5 degrees C.

B. Clean, dry air shall be used with not less than 345 kilopascal air pressure at the air regulator. Not more than 15 meters of 9.5 millimeter ID hose shall be used between the air regulator and the metallizing gun. The metallizing gun shall be started and adjusted with the spray directed away from the work. During the spraying operation and depending upon the equipment being used, the gun shall be held from 75 to 250 millimeters from the surface of the work.

C. Manual spraying shall be done in a block pattern, typically 0.6 meters square. The sprayed metal shall overlap on each pass to ensure uniform coverage. The specified thickness of the coating shall be applied in multiple layers. In no case are fewer than two passes of thermal spraying, overlapping at right angles, acceptable.

D. At least one single layer of coating shall be applied within 4 hours of blasting and the surface shall be completely coated to the specified thickness within 8 hours of blasting.

E. The minimum coating thickness shall be 0.152 millimeters unless otherwise shown in the Plans.

3.03 Applications of Shop Coats and Field Coats

A. The surface shall be wiped clean with solvent immediately before applying the wash primer. The wash primer, dry film thickness shall not exceed 13 micrometers or be less than 8 micrometers. It shall be applied using an appropriate spray gun except in those areas where brush or roller application is necessary. The subsequent shop or field coats shall be applied no less than one-half hour after a wash primer.

B. The shop coat shall be applied according to Section 6-07, ASTM D2092 and the paint manufacturer's recommendations.

C. All field coats shall be applied according to Section 6-07 and the paint manufacturer's recommendations.

Payment

All costs in connection with producing the metallic coatings as specified shall be included in the unit contract price for the applicable item or items of work.